

5. Total Maximum Daily Loads

A Total Maximum Daily Load (TMDL) prescribes an upper limit on discharge of a pollutant from all sources so as to assure water quality standards are met. It further allocates this load capacity (LC) among the various sources of the pollutant. Pollutant sources fall into two broad classes: point sources, each of which receives a wasteload allocation (WLA); and nonpoint sources, which receive a load allocation (LA). Natural background (NB), when present, is considered part of the load allocation, but is often broken out on its own because it represents a part of the load not subject to control. Because of uncertainties regarding quantification of loads and the relation of specific loads to attainment of water quality standards, the rules regarding TMDLs (Water quality planning and management, 40 CFR 130) require a margin of safety (MOS) be a part of the TMDL.

Practically, the MOS is a reduction in the load capacity that is available for allocation to pollutant sources. The natural background load is also effectively a reduction in the load capacity available for allocation to human made pollutant sources. This can be summarized symbolically as the equation: $LC = MOS + NB + LA + WLA = TMDL$. The equation is written in this order because it represents the logical order in which a loading analysis is conducted. First the LC is determined. Then the LC is broken down into its components: the necessary MOS is determined and subtracted; then NB, if relevant, is quantified and subtracted; and then the remainder is allocated among pollutant sources. When the breakdown and allocation is completed we have a TMDL, which must equal the LC.

Another step in a loading analysis is the quantification of current pollutant loads by source. This allows the specification of load reductions as percentages from current conditions, considers equities in load reduction responsibility, and is necessary in order for pollutant trading to occur. Also a required part of the loading analysis is that the LC be based on critical conditions – the conditions when water quality standards are most likely to be violated. If protective under critical conditions, a TMDL will be more than protective under other conditions. Because both LC and pollutant source loads vary, and not necessarily in concert, determination of critical conditions can be more complicated than it may appear on the surface.

A load is fundamentally a quantity of a pollutant discharged over some period of time, and is the product of concentration and flow. Due to the diverse nature of various pollutants, and the difficulty of strictly dealing with loads, the federal rules allow for “other appropriate measures” to be used when necessary. These “other measures” must still be quantifiable, and relate to water quality standards, but they allow flexibility to deal with pollutant loading in more practical and tangible ways. The rules also recognize the particular difficulty of quantifying nonpoint loads, and allow “gross allotment” as a load allocation where available data or appropriate predictive techniques limit more accurate estimates. For certain pollutants whose effects are long term, such as sediment and nutrients, EPA allows for seasonal or annual loads.

5.1 Instream Water Quality Targets

The goal of the TMDL is to restore “full support of designated beneficial uses” on all 303(d) listed streams within the Big Lost River subbasin and to bring waters into compliance with state

Big Lost River Subbasin Assessment and TMDL

water quality standards. Water quality pollutants of concern for which a TMDL will be written are sediment and temperature. A TMDL will not be written for streams listed with flow alteration as a pollutant. Flow (or lack of flow) is not a pollutant as defined by CWA Section 502(6). The objective of this TMDL is to establish a declining trend in sediment and subsequently temperature loading. Monitoring of the pollutant load and beneficial use support will occur as part of the implementation phase of the TMDL. Pollutant reductions can be attained, in part, by improving channel dimension, vegetative buffers, and improving stream bank stability for attainment of beneficial use support.

The current state of science does not allow specific identification of streambank stability, a sediment load or load capacity to meet the narrative criteria for sediment and to fully support beneficial uses for coldwater aquatic life and salmonid spawning. All that can be said is that the load capacity lies somewhere between current loading and levels that relate to natural streambank erosion levels. We presume that beneficial uses were, or would be, fully supported at natural background sediment loading rates that are assumed to involve at least 80% bank stability. This is also assumed to support temperature regimes that would meet state water quality targets for temperature. In order to attain beneficial use support, 80% bank stability will determine the erosion conditions to be used as the sediment target for this TMDL. Streambank erosion estimates are derived using NRCS methodologies adapted by DEQ as outlined in section 2.3 of the subbasin assessment portion of this document.

To improve the quality of spawning substrate and rearing habitat in the Big Lost River subbasin, it is necessary to reduce the component of subsurface fine sediment (<6.35 mm) to below 28% for improved survival and emergence of trout eggs and fry. Less than 28% subsurface fines will be the sediment target for this TMDL. This will be determined using a modified McNeil sediment sampling procedure that has previously been utilized by the Forest Service and DEQ in the watershed (McNeil and Ahnell 1964).

The temperature TMDL target is the numeric salmonid spawning criteria listed in the state water quality standards [IDAPA 58.01.02.250.02.b]. Instream targets shall be less than the instantaneous temperature 13°C (55.4°F) and the maximum daily average temperature below 9°C (48.2°F) during salmonid spawning periods.

Design Conditions

This sediment loading analysis characterizes sediment loads using average annual rates determined from empirical characteristics that developed over time within the influence of peak and base flow conditions. Annual erosion and sediment delivery are functions of climatic variability where above average water years typically produce higher erosion and subsequently higher sediment loads from unstable streambanks. Stable streambanks that provide access of peak flow to the flood plain are able to withstand extreme hydrologic events without becoming unstable. Additionally, the annual average sediment load is not distributed equally throughout the year. To quantify the seasonal and annual variability and critical timing of sediment loading, climate and hydrology must be considered. Erosion typically occurs during a few critical months during spring runoff when bankfull flow occurs.

Big Lost River Subbasin Assessment and TMDL

The temperature critical time periods for salmonid spawning in the Big Lost River subbasin are identified as March 15th through June 30th for rainbow trout and Yellowstone cutthroat trout; and September 15th through November 15th for brook trout.

Target Selection

Temperature

Temperature TMDL criteria is based on Idaho's existing numeric criteria for salmonid spawning. Instream targets shall be less than the instantaneous temperature of 13°C and the maximum daily average temperature below 9°C during salmonid spawning periods.

Sediment

Target selection of sediment is supported by existing narrative criteria of [IDAPA 58.01.02.200.08].

Sediment targets for this subbasin are based on streambank erosion related to streambank stability of 80%. Loading rates are quantitative allocations expressed in tons/year and rates are identified in units of tons per mile per year. Reduction in streambank erosion prescribed in this TMDL is directly linked to the improvement streambank stability related to riparian vegetation vigor and density adequate to armor streambanks thereby reducing lateral recession. Over time stream channels are expected to regain equilibrium and provide natural mechanisms for trapping sediment and reducing stream energy which in turn reduces stream erosivity and instream sediment loading. It is assumed that by reducing chronic sediment, there will be a decrease in ambient stream temperature that will comply with water quality standards. Additionally, improved streambank stability will reduce subsurface fine sediment and improve instream habitat features that will ultimately improve the status of beneficial uses and the quality of the fishery.

It is assumed that natural background sediment loading rates from bank erosion equate to 80% bank stability as described in Overton and others (1995), where banks are expressed as a percentage of the total estimated bank length. Natural condition streambank stability potential is generally 80% or greater for Rosgen A, B, and C channel types in plutonic, volcanic, metamorphic, and sedimentary geology types. Therefore, an 80% bank stability target based on streambank erosion inventories shall be the target for sediment load reduction.

Stream substrate sediment size composition can directly impair spawning success, egg survival to emergence, rearing habitat, and fish escapement from streambed spawning gravels. It is necessary to reduce the component of subsurface fine sediment less than 6.35 mm to below 28% to achieve management objectives outlined in the annual Forest Service Monitoring Completion Reports (SCNF 2002). This sediment particle size parameter should continue to be considered as part of target monitoring by the Forest Service to evaluate any significant shift in subsurface fine particle frequency distribution and to guide riparian management.

Monitoring Points

Subsurface Sediment

Substrate sediment monitoring sites are already established in spawning habitat determined suitable for salmonid spawning within listed stream segments using the McNeil core sediment sampling method. Those sites should continue to be monitored and the results used to refine management practices to protect water quality, coldwater aquatic life and salmonid spawning

Streambank Stability

Streambank erosion inventories/assessments should be conducted on sediment impaired streams to evaluate overall bank stability. Erosion inventories should be combined with riparian vegetation and instream habitat monitoring using established Forest Service protocols. The results of this monitoring should be used to refine management practices to protect water quality, cold water aquatic life and salmonid spawning and to assure that waters remain within water quality criteria identified by state and federal water quality criteria.

Temperature Monitoring

Stream temperatures should continue to be monitored with an instream temperature logger at previously established monitoring locations to maintain consistency. Additional sites may require monitoring to ascertain compliance of other waters with water quality standards.

5.2 Load Capacity

A load capacity is “the greatest loading a waterbody can receive without violating water quality standards” [40 CFR §130.2]. This must be at a level to meet “...water quality standards with season variations and a margin of safety which takes into account any lack of knowledge...” (Clean Water Act § 303(d)(C)). Likely sources of uncertainty include lack of knowledge of assimilative capacity, uncertain relation of selected target(s) to beneficial use(s), and variability in target measurement.

Sediment

The load capacity for sediment from streambank erosion shall be based on assumed natural streambank stability of greater than or equal to 80% (Overton et al 1995). Since it is presumed that beneficial uses were or would be supported at natural background sediment loading rates, the loading capacity lies somewhere between the current loading level and sediment loading from natural streambank erosion.

- Natural background loading rates are not necessarily the loading capacities. An adaptive management approach will be used to provide reductions in sediment loading based on best management practice (BMP) implementation coupled with data from monitoring to determine the loading rate at which beneficial uses are supported.

Big Lost River Subbasin Assessment and TMDL

- The estimated capacity is directly related to the improvement of riparian vegetation characteristics and streamchannel conditions within the range of natural variability for desirable potential channel types. Increased vegetative cover provides a protective covering of streambanks, reduces lateral recession, traps sediment, and reduces erosive energy of the stream.
- Keeping other nonpoint sources of sediment in check will be important as well. This includes maintenance of roads and places where trails and roads make stream crossings. Evaluation of land management practices to minimize erosion and sediment transport into streams must also occur. Hillslope and mass wasting erosion are considered to be within the range of natural background variability because explicit significant sediment sources from these features were not observed and no data relating to these features was submitted.

Temperature

The loading capacities for streams exceeding water quality criteria for temperature are based on Idaho's temperature criteria for salmonid spawning. Water temperatures must be less than the criteria for instantaneous temperature of 13°C (55.4°F) and the maximum daily average temperature of 9°C (48.2°F) during salmonid spawning periods.

- The loading capacity is season specific and should apply during salmonid spawning periods.
- The use of the highest recorded temperature rather than the average maximum to compare to criteria to determine load reduction provides an implicit margin of safety to assure compliance with water quality criteria.
- Since 2001-2003 were exceptionally hot and dry years, setting load reductions based on the maximum observed temperature provides an additional implicit margin of safety.

5.3 Estimates of Existing Pollutant Loads

Regulations allow that loadings "...may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading," (Water quality planning and management, 40 CFR 130.2(I)). An estimate must be made for each point source. Nonpoint sources are typically estimated based on the type of sources (land use) and area (such as a subwatershed), but may be aggregated by type of source or land area. To the extent possible, background loads should be distinguished from human-caused increases in nonpoint loads. Table 47 summarizes point source permitted discharges in the Big Lost River watershed. Temperature loads are summarized in Table 48, and sediment loads are summarize in Table 49.

Table 56. Existing wasteloads from point sources in the Big Lost River Subbasin.

Wasteload Type	Location	Load	NPDES ¹ Permit Number
Lost River Hatchery	Upper Warm Springs Creek (North Channel)	TSS 5 mg/l Daily Ave, 15.0 mg/l Daily Max, Settleable Solids 0.1 ml/l Daily Ave.	IDG130073
Mackay Fish Hatchery	Upper Warm Springs Creek (South Channel)	TSS 5 mg/l Daily Ave, 15.0 mg/l Daily Max, Settleable Solids 0.1 ml/l Daily Ave	IDG130030
City of Mackay Waste Treatment Facility	Swauger Slough (Near the Big Lost River at Mackay, Idaho)	BOD 5d 20°C 63mg/l 30d Ave. 95 mg/l 7d Ave max pH 6.0 min / 9.0 max TSS 70 mg/l 30d Ave 105 7d Ave max FC (per 100 ml) 100 cfu 30d geo mn 200 cfu 7d geo mn Flow Report 30dAve Chlorine (tot.resid) 1.2 mg/l max BOD 5d % removal 65% mo Ave min	ID002302-7

¹National Pollutant Discharge Elimination System

Table 57. Current temperature Loads from nonpoint sources in Big Lost River Subbasin.

Location	Load			
East Fork Big Lost River 17040218SK039 17040218SK033	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	21.3°C	15.2°C	16.3°C	12.1°C
Corral Creek 17040218SK041	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	21.7°C	14.39°C	17.1°C	11.44°C
Starhope Creek 17040218SK035	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	20.6°C	13.6	19.76°C	11.42°C
Wildhorse Creek 17040218SK030	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	16.7°C	11.33°C	15.2°C	10.6°C
North Fork Big Lost River 17040218 SK027	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	19.0°C	12.92°C	16.3°C	10.6°C
Summit Creek 17040218SK028	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	17.8°C	11.6°C	15.2°C	10.52°C
Big Lost River at Howell Ranch 17040218SK024	No Data		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	14.6°C	11.1°C	13.3°C	10.4°C
Warm Springs Ranch 17040218SK043	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	20.9°C	14.5°C	15.2°C	10.9°C

Big Lost River Subbasin Assessment and TMDL

Location	Load			
Antelope Creek 17040218SK052 17040218SK047	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	19.0°C	13.86°C	15.6°C	12.24
	Max Daily	Daily Ave	Max Daily	Daily Ave
	23.2°C	15.1°C	N/A	N/A
Cherry Creek 17040218SK050	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	18.68°C	16.47°C	14.1°C	13.2°C
Bear Creek 17040218SK053	Spring Spawning		Fall Spawning	
	Max Daily	Daily Ave	Max Daily	Daily Ave
	19.4°C	14.15°C	16.7°C	12.39°C

Table 58. Current sediment loads from nonpoint sources in Big Lost River Subbasin.

Load Type	Location	Load	Estimation Method
Sediment Load Reduction Based on Average Annual Loading Rate: tons/year	East Fork Big Lost River Headwaters to Confluence with North Fork	1212 Tons per Year	Percent Reduction from Observed Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	Corral Creek Headwaters to Confluence with East Fork	250 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	Starhope Creek Headwaters to Confluence with East Fork	249 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	Wildhorse Creek Headwaters to Confluence with East Fork	103 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	North Fork Big Lost River Headwaters to Confluence with North Fork	163 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	Summit Creek Headwaters to Confluence with East Fork	45 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	Twin Bridges Creek Headwaters to Confluence with East Fork	536 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Estimated Average Annual Loading Rate: tons/year	Thousand Springs Creek Headwaters to Confluence with East Fork	13 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Average Annual Loading Rate: tons/year	Antelope Creek Forest Boundary to S. Fk. Antelope Creek Diversion	888 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Average Annual Loading Rate: tons/year	Bear Creek Headwaters to Confluence with North Fork	52 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability
Sediment Load Reduction Based on Average Annual Loading Rate: tons/year	Cherry Creek Headwaters to Confluence with North Fork	144 Tons per Year	Percent Reduction from Estimated Erosion Rate Based on 80% Bank Stability

5.4 Load Allocation

Wasteload Allocation

There will be a wasteload allocation for both of the hatcheries on Warm Springs Creek (North and South Channel), and the Waste Treatment Plant in Mackay. The wasteload for the waste treatment plant will reflect the new NPDES permit that is in review for the facility and will likely become effective in March 2004 (Table 50). Since the Mackay Waste Treatment Facility discharges to a wetland (Swauger Slough) this is considered an added measure of safety and accounts for a margin of safety.

The wasteload allocation for the hatcheries will provide for 5 mg/l TSS maximum discharge during pond cleaning and loading. The daily average will be set at 2 mg/l daily average TSS and settleable solids. This will effectively remove any discharge from the hatcheries to Warm Springs Creek. The effects of current permit levels on effluent loading have not been effective to protect aquatic life in upper Warm Springs Creek. Sludge from effluent has been noted as far downstream as the Big Lost Ranch and the 6X Ranch above the Reservoir. Adequate settling facilities have been designed to eliminate discharge from the Lost River Hatchery and the owner is willing to aid in installing the best management practices to effect this reduction. The Mackay State Fish Hatchery already has in place a settling system that infiltrates effluent during cleaning and use of this system will be extended to other periods when discharge may be impacted.

The wasteload allocation for temperature from the hatcheries will be set to not exceed current Idaho water quality standards for temperature for cold water aquatic life and salmonid spawning. Presently these regulations are set for cold water aquatic life, to not exceed 22° C instantaneous or 19° C daily average. For salmonid spawning, from March 1 through June 30, and September 15 through November 15 standards are set for 13° C daily maximum, and 9° C daily average.

Load Allocation

Temperature load allocations are based on the percent reduction of the highest observed temperature exceedence for the spring or fall spawning period, whichever is greater, to attain water quality standards (Table 51). Sediment load allocations are intermediate targets that are felt to result in attainment of water quality standards for temperature. Improving streambank erosion is assumed to also result in the channel morphological changes required to bring the temperature regime into compliance with spawning temperature criteria (Table 52).

Margin of Safety

Reducing the wasteload allocation to zero during the activities that create the greatest discharge of effluent adequately provides a conservative explicit margin of safety for hatcheries. With regard to the Mackay Waste Treatment Facility the combination of utilizing more restrictive permit limits and the fact that the facility discharges to a wetland adjacent to a water that is not considered impaired provides an adequate and conservative implicit margin of safety.

Spawning criteria are the most restrictive criteria and will provide an adequate margin of safety to account for compliance. Taking the greatest exceedence during the dry periods over which the temperature data has been accumulated accounts for an additional margin of safety that is adequate to restore compliance with water quality standards. The margin of safety (MOS)

Big Lost River Subbasin Assessment and TMDL

factored into sediment load allocations is implicit. The MOS includes the conservative assumptions used to develop existing sediment loads. Conservative assumptions made as part of the sediment loading analysis include: 1) desired bank erosion rates are representative of assumed natural background conditions; 2) water quality targets for percent depth fines are consistent with values measured and set by local land management agencies based on established literature values and incorporate an adequate level of fry survival to provide for stable salmonid production.

Seasonal Variation

Seasonal variability was built-in to this TMDL by developing sediment loads using annual average rates determined from empirical characteristics that developed over time within the influence of runoff events and peak and base flow conditions. Streambank erosion inventories take into account that most bank recession occurs during peak flow events, when the banks are saturated. The estimated annual average sediment delivery is a function of bankfull discharge. It is assumed that the accumulation of sediment within dry channels is continuous until flow resumes and the accumulated sediment is transported and deposited.

Seasonal variability was integrated into temperature TMDLs by taking into account the critical timeframes associated with salmonid reproduction.

Background

Natural background loading rates are assumed to be the natural sediment loading capacity of 80% or greater streambank stability and 28% or less subsurface fine sediment. Therefore natural background is accounted for in the load capacity. Hillslope and mass wasting are considered to be within the range of natural variability for natural background sediment sources because anthropogenic exacerbation that impacts water quality was not identified. The load allocation becomes the current load and must not be increased by management activities.

Natural background conditions for temperature can exceed the criteria. This is seen today in wilderness waters that are relatively unperturbed, however natural temperature regimes in the Big Lost River subbasin have not been isolated. As research accumulates on natural background temperature for flowing water in the Big Lost River Subbasin the TMDL may be adjusted, or site specific criteria may be developed.

Reserve

If it is determined that full beneficial use support is achieved and standards are being met at temperature and sediment loading rates higher than those set forth in this TMDL then the TMDL will be revised accordingly. Conversely, within a reasonable time after full implementation of best management practices, if it is determined that full beneficial use support is not forthcoming and or standards are not being met then additional best management practices will be required.

Table 59. Wasteload allocation from point sources in the Big Lost River Subbasin.

Wasteload Type	Load	Load Allocation	NPDES ¹ Permit Number
Lost River Hatchery	TSS 5 mg/l Daily Ave, 15.0 mg/l Daily Max, Settleable Solids 0.1 ml/l Daily Ave.	TSS 2mg/l Daily Ave 2 mg/l Daily Max Settleable Solids 2 ml/l Daily Ave Temperature Comply with current state standards for CWAL and SS	IDG130073 36 months to meet allocation
Mackay Fish Hatchery	TSS 5 mg/l Daily Ave, 15.0 mg/l Daily Max, Settleable Solids 0.1 ml/l Daily Ave	TSS 2mg/l Daily Ave 2 mg/l Daily Max Settleable Solids 2 ml/l Daily Ave Temperature Comply with current state standards for CWAL and SS	IDG130030 36 months to meet allocation
City of Mackay Waste Treatment Facility	BOD 5d 20°C 63mg/l 30d Ave. 95 mg/l 7d Ave max pH 6.0 min / 9.0 max TSS 70 mg/l 30d Ave 105 7d Ave max FC (per 100 ml) 100 cfu 30d geo mn 200 cfu 7d geo mn Flow Report 30dAve Chlorine (tot.resid) 1.2 mg/l max BOD 5d % removal 65% mo Ave min	BOD 5d 20°C 45mg/l 30d Ave. 65 mg/l 7d Ave max pH 6.0 min / 9.0 max TSS 45 mg/l 30d Ave 65 7d Ave max E Coli (per 100 ml) 126/100ml 30d geo mn 406/100ml inst. max Flow Report 30dAve Chlorine (tot.resid) 0.5 mg/l 30d Ave 0.75 mg/l 7d Ave max	ID002302-7 Allocations effective upon approval of NPDES permit for the City of Mackay

¹National Pollutant Discharge Elimination System

Table 60. Temperature load allocations for Big Lost River subbasin.

Stream	Temperature Statistic	Highest Recorded Temperature (Current Load)	Criteria (Loading Capacity)	Load Reduction	% Reduction
East Fork Big Lost River	Max Daily	21.3	13°C	-8.3	39.0
	Daily Ave	15.2	9°C	-6.2	40.8
Corral Creek	Max Daily	21.7	13°C	-8.7	40.1
	Daily Ave	14.39	9°C	-5.39	37.5
Starhope Creek	Max Daily	20.6	13°C	-7.6	36.9
	Daily Ave	13.6	9°C	-4.6	33.8
Wildhorse Creek	Max Daily	16.7	13°C	-3.7	22.2
	Daily Ave	11.33	9°C	-2.33	20.6
North Fork Big Lost River	Max Daily	19	13°C	-6	31.6
	Daily Ave	12.92	9°C	-3.92	30.3
Summit Creek	Max Daily	17.8	13°C	-4.8	27.0
	Daily Ave	11.6	9°C	-2.6	22.4
Big Lost River at Howell Ranch	Max Daily	14.6	13°C	-1.6	11.0
	Daily Ave	11.1	9°C	-2.1	18.9
Warm Springs Creek	Max Daily	20.9	13°C	-7.9	37.8
	Daily Ave	14.5	9°C	-5.5	37.9
Antelope Creek at Forest Boundary	Max Daily	19	13°C	-6	31.6
	Daily Ave	13.86	9°C	-4.86	35.1
Antelope Creek at Diversion	Max Daily	23.2	13°C	-10.2	44.0
	Daily Ave	15.1	9°C	-6.1	40.4
Cherry Creek	Max Daily	18.68	13°C	-5.68	30.4
	Daily Ave	16.47	9°C	-7.47	45.4
Bear Creek	Max Daily	19.4	13°C	-6.4	33.0
	Daily Ave	14.15	9°C	-5.15	36.4

Table 61. Erosion load allocations for Big Lost River subbasin.

Stream	Estimated Current Load		Load Capacity/Load Allocation		Reductions		
	Existing Erosion Rate (t/mi/yr.)	Total Erosion (t/yr.)	Erosion Rate (t/mi/yr.)	Total Erosion (t/yr.)	Total Erosion Reduction (t/yr.)	Total Erosion Rate Reduction (t/mi/yr.)	Total Erosion % Reduction to Meet Load Capacity
East Fork Big Lost River	Composite	1218	---	172	1046	Composite	85.9
Corral Creek	36	250	6.0	39	211	30	84.4
Starhope Creek	26	249	7.0	69.0	180	19	72.3
Wildhorse Creek	21	103	6.0	28.5	74.5	15	72.3
North Fork Big Lost River	Composite	285	---	54.3	230.7	Composite	80.9
Summit Creek	11	45	4	14.0	31	7	68.9
Twin Bridges Creek	115	536	7	33.1	502.9	108	93.8
Thousand Springs Creek	10	13	3	3.5	9.5	7	73.1
Warm Springs Creek	Composite	12.8	---	26.6	-13.8	Composite	-107.8
Antelope Creek	Composite	888	---	118	770	Composite	86.7
Bear Creek	11	52	4.0	17.0	35	7	67.3
Cherry Creek	Composite	156	---	53.2	102.8	Composite	65.9

5.5 Implementation Strategies

DEQ recognizes that implementation strategies for TMDLs may need to be modified if monitoring shows that the TMDL goals for restoring full beneficial use support or restoring compliance with water quality standards are not being met or significant progress is not being made toward achieving the goals. Conversely, goals may be met through improvement of riparian management techniques.

IASCD has provided engineering design support to developing plans for a settling basin to be implemented at the Lost River Hatchery that would result in eliminating discharge of total suspended solids and settleable solids. The owner/operator has expressed interest in cost sharing to implement this structural improvement. Funding sources will be sought for this project by Designated Management Agencies and interested parties to effect this improvement.

The Mackay State Hatchery, operated by the Idaho Department of Fish and Game already has an effluent system that should result in elimination of discharge of total suspended solids and settleable solids. If monitoring should show that this is not the case then structural improvements would be required to effect the load allocation prescribed in this TMDL.

Big Lost River Subbasin Assessment and TMDL

Several state designated land management agencies are involved where watershed implementation of riparian management is concerned. The largest portion of the watershed is under federal management. The valley bottom below Chilly Butte is a mosaic of private, state and federal land. Idaho Department of Lands and IASCD will provide implementation strategies for riparian management on State Endowment lands and private lands. Implementation plans may also be developed by federal land management agencies for public land managed by federal agencies.

Approach

It is anticipated that by improving riparian management practices, overall riparian zone recovery will precipitate streambank stabilization, reduce sedimentation, increase canopy cover, and lower stream temperatures, all of which will precipitate overall stream habitat improvements. Such improvements will contribute to an overall improvement in stream morphology and habitat, shifting stream health towards beneficial use attainment.

Time Frame

The expected time frame for attaining water quality standard and restoring beneficial use is a function of management intensity, climate, ecological potential, and natural variability of environmental conditions. If implementation of best management practices is embraced enthusiastically some improvements may be seen in as little as several years. Even with aggressive implementation, however, some natural processes required for satisfying the requirements of this TMDL may not be seen for many years. The deleterious effects of historic land management practices have accrued over many years and recovery of natural systems may take longer than administrative needs allow for.

Responsible Parties

IASCD, IDL, BLM, and FS are identified as the state and federal entities that will be involved in or responsible for developing BMP implementation plans and implementing the TMDL. The Idaho Department of Agriculture is the Designated Management Agency responsible for developing implementation programs for aquaculture.

Monitoring Strategy

It is presumed that instream temperatures will continue to be monitored with temperature loggers to evaluate improvements or declines in temperature regimes. Streambank erosion inventories are intended for rapid assessment, but will allow for the evaluation of streambank condition in the absence of more rigorous evaluation by established federal land management assessment protocol. Stream subsurface fine sediment should continue to be assessed through McNeil sediment core sampling at established intervals to identify trends toward meeting sediment targets. Beneficial Use Reconnaissance Program monitoring will continue to be conducted by DEQ and should also provide insight regarding implementation effectiveness and developing stream conditions.

5.6 Conclusions

The Big Lost River watershed is naturally diverse in conditions that favor aquatic life in some areas and not in others. The upper watershed exhibits the potential to support quality fisheries and recreation opportunities and multiple land uses related to agriculture and mining. These multiple land uses are compatible and sustainable if managed in balance. Equal consideration must be given to the natural sensitivity of environmental conditions if the diverse land use practices that have been a part of the Big Lost River Watershed are to be sustained in areas that can support aquatic life.

There are a number of mechanisms by which the full support of aquatic life can be extended to areas that are marginal due to natural variability of flowing water. An important consideration is to create viable refuge in key tributaries for fish and other aquatic species when the flow regime is naturally altered in mainstem waters. In other cases man manages flow for agricultural production and this management has been the established priority over many years prior to the laws that govern environmental quality. The right to divert water for economic benefit is protected as a property right in the laws of the state of Idaho. The potential synergism between natural and anthropogenic flow alteration can severely limit the potential for fisheries and aquatic life in natural systems. The potential also exists, however, for voluntary and cooperative projects to enhance water quality and aquatic life beneficial uses, while concurrently enhancing the availability of water for economic use. This is the overall optimum scenario that should be sought in areas that are today marginal for both uses.

The direct relationship between stream erosion and stream temperatures is apparent with the coupling of sediment and temperature 303(d) listings. Stream channel migration is a natural process that occurs at a slow rate under conditions of sediment equilibrium. Lateral recession is a natural process accompanied by depositional mechanisms that are balanced in a system that is stable and in equilibrium. Streambank erosion, however, can be accelerated by reducing/eliminating riparian vegetation and the detachment of bank material (clumping and sloughing), all of which disrupt the natural stream system contributing to elevated stream sediment and elevation of stream temperature.